Mars Aqueous Processing System, Phase I

Completed Technology Project (2004 - 2004)

Project Introduction

Mars Aqueous Processing System (MAPS) is an innovative method to produce useful building materials from Martian regolith. Acids and bases produced from the regolith are used to aid the preparation of metals (such as iron) and cement ingredients (such as lime and aggregate) for construction of habitats and infrastructure needed for early human colonization. As more regolith is processed, more acids and bases will be produced for use in manufacture of plastics, metals, polymers, and reagents useful for later, larger-scale human habitation. With the apparent abundance of water in certain locations on Mars, the proposed technology will enable the manufacture and fabrication of a variety of materials using only Mars indigenous materials with the use of processing equipment and catalysts brought from Earth. The proposed processing methods are capable of extracting and separating regolith constituents via aqueous extraction followed by selective precipitation based on solution pH and oxidation potential. Thermal treatments such as drying (to remove moisture), roasting (to remove volatile sulfate and chloride acid precursors), and oxide reduction (using hydrogen, carbon monoxide, or carbon derived from Martian water and atmosphere) are integrated with the aqueous extraction methods to manufacture the basic building materials required to facilitate human habitation.

Primary U.S. Work Locations and Key Partners

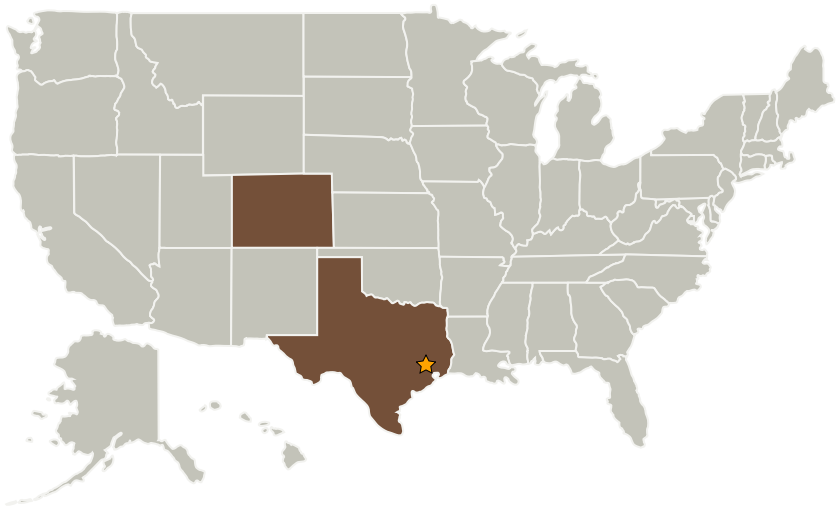

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Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Pioneer Astronautics	Supporting Organization	Industry Historically Underutilized Business Zones (HUBZones)	Lakewood, Colorado

Primary U.S. Work Locations	
Colorado	Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Mark Berggren

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.4 Sustainable Manufacturing